Liaison

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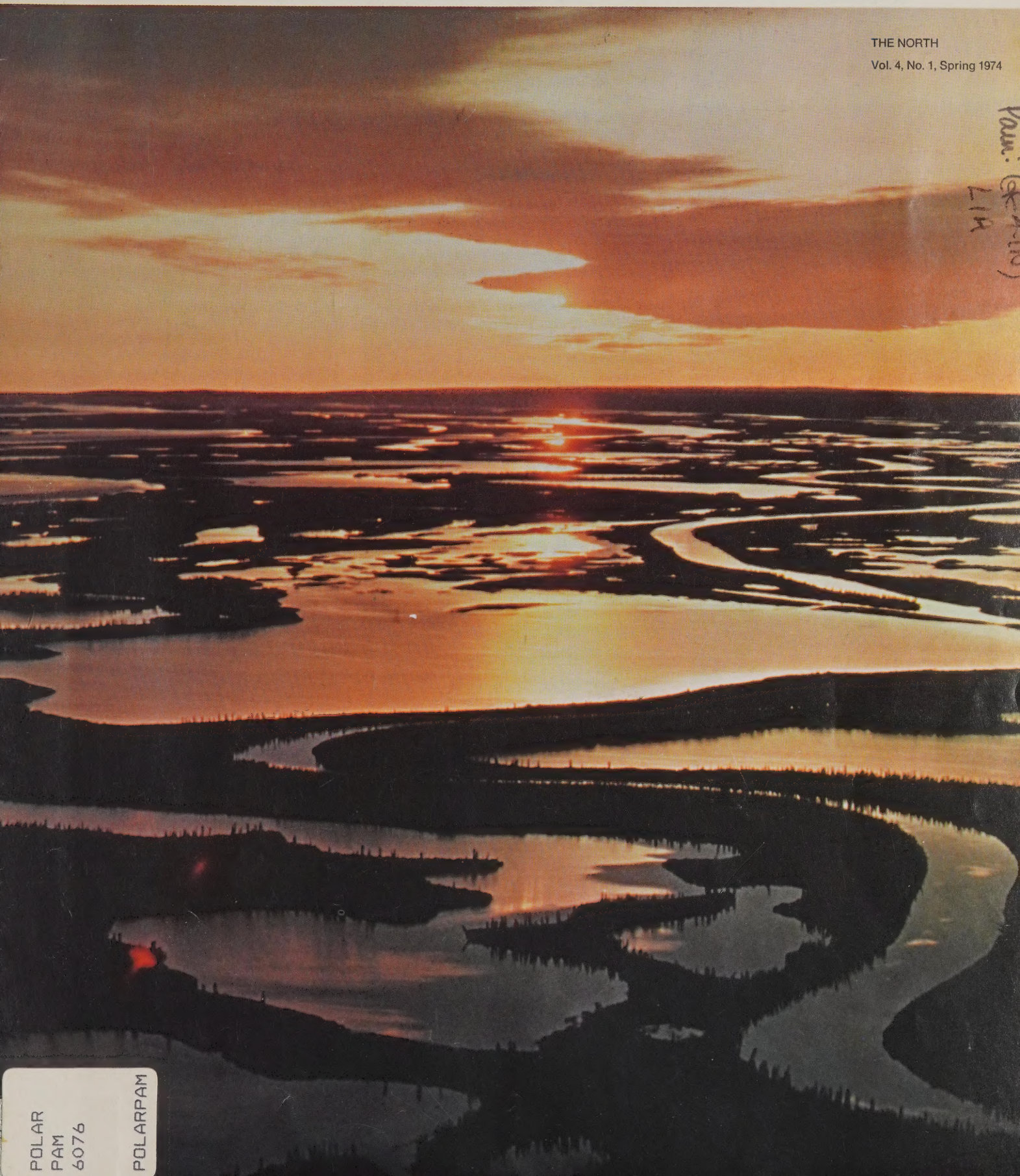

editorial

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Liaison is published three times a year in English and French editions by the Sales Promotion and Advertising Department of Canada Cement Lafarge Ltd., 606 Cathcart, Montreal 111, Quebec, as a source of information about developments in the cement and concrete industries. Articles pertaining to the economic outlook and social climate as they affect the Construction Industry are also featured. Unless otherwise indicated, text in this issue may be reprinted editorially without permission, but a credit line and letter of intent would be appreciated. Permission should be obtained to reproduce illustrations.

Front cover — July Midnight Sun over the Mackenzie River Delta in the Northwest Territories.

For many decades the Yukon and the Northwest Territories existed in the minds of many Canadians chiefly in legend. The Yukon was usually associated with the ballads of Robert Service and the NWT with a lone Mountie mushing along behind a team of huskies across the trackless waste, in the dead of winter, to get-his-man. Thus, to the majority of Canadians, the North was a forbidding, barren emptiness best left to the Eskimo — and so the film producers were portraying this upper half of Canada, much of which was known to early explorers who penetrated the North long before the southern prairies were seen by white men.

Through the years, hardy, adventurous souls have continued to explore the northland and found evidence of oil and vast deposits of coal, iron ore, base metals, and rare and precious minerals. Only the richest of these deposits have been exploited and few have survived the excessive cost of bringing supplies to the Arctic due to the severe weather and lack of adequate transportation facilities.

History shows that both technology and economics have always rigorously governed man's existence in the Arctic regions. Out of sheer necessity, the Eskimo and Indian people settled only where the harsh dictates of economics made life possible. The early Europeans sought the passage to the Orient for commercial reasons. They stayed to trade in furs and to hunt the whale. Later, gold and other minerals lured men to the North. Immediately dubbed The City of Gold, Dawson in 1898 was the scene of the largest and wildest gold rush the world has ever seen.

The need to find new sources of base metals lead to significant resource developments in the North which is considered one of the world's great storehouses of mineral wealth. First in the Northwest Territories came the famous Eldorado uranium-silver mine in 1932, then a few years later the first gold mine opened at Yellowknife Bay. The Pine Point mine which ranks among the world's largest deposits of lead and zinc went into production in 1964. This mining bonanza included the Yukon Territory with large producing mines such as Cassiar Asbestos, United Keno Hill, Whitehorse Copper, Tantalus Butte Coal and Hudson-Yukon. Furthermore, at least a dozen new important deposits have been discovered recently just east of the Anvil find along the Yukon-NWT border.

The existence of oil in the nation's last frontier has been known since 1789 when Alexander Mackenzie recorded the presence of oil seeps along the banks of the river that now bears his name. By the turn of this century other explorers were recording oil seepages along the north shore of Great Slave Lake. It was in 1920 that an Imperial Oil Ltd. subsidiary drilled the famous discovery well at the Norman Wells oil field thus making Canada's North an oil producing region.

Why was a drilling crew looking for oil in such a remote location more than half a century ago? Because of the need. In 1920, Canada produced only 196,000 barrels of oil, but it imported 8,312,000 barrels. When the discovery well came in at Norman Wells, it was described as the largest producing oil well in Canada. Its flow rate was estimated at 100 barrels per day in 1922, but the reserves were not enough to justify a pipeline to markets in the south, and the demand for fuels in the Territories was too small to keep the field producing. The wells were shut in and they stayed closed until the discovery of gold at Great Bear Lake created a demand for fuels in the region. The refinery was put into limited operation again in 1932, but when the Japanese entered the Second World War in 1941, Norman Wells suddenly assumed strategic importance as a safe source of petroleum for the armies and navies of the northern Pacific.

A pipeline 600 miles to Whitehorse was built and by 1943 Imperial Oil had drilled enough wells to meet the military requirements of 3,000 barrels per day. When those hectic days were over, the pipeline was closed in 1945 and the refinery at Whitehorse was sold to Imperial Oil Ltd., demantled and moved to Edmonton where it was rebuilt to process the crude from the newly discovered field at Leduc in 1947.

The harsh climate, the rugged terrain and the high transportation costs in the North had turned risk capital inward to more amenable regions. Only in recent years with new demands for oil and gas and with more sophisticated equipment did attention once again turn to the North. Now, of course, investments that would have staggered even the experts a decade ago, are being made and the search for petroleum reserves in the North and the development of supply lines has been going on at an astounding pace in recent years. Ever since Atlantic Richfield unlocked the resources of the North Slope in 1968, and other oil groups found oil and gas in the Mackenzie Delta, the Beaufort Basin, and the Arctic Islands, there has been a shift of exploration from the known Alberta oil fields to the Far North's great potential reservoir of the "black gold". However, the thinking among the petroleum industry people is that, on an aggregate basis, the North is less than halfway to commercial thresholds for its oil and gas prospects, needing under the most favorable circumstances, another $5 billion in exploratory and development expenses and twice as much again to get its fuel to market.

The Canadian Energy Policy adopted recently by the Federal Government and the

rapidly increasing cost of imported crude oil have caused a public awareness of the value of our established hydrocarbon resources and a new appraisal of the potential in Canada's yet unexplored areas. Thus, we are now witnessing a period of concentration on the tremendous resource potential, particularly in oil and gas and mining, and the methods whereby northern resources could be brought to market at competitive prices. These developments are causing the build-up of an expanding infrastructure and a number of significant advances toward territorial self-government.

Canada's policy for the development of the Northwest Territories and the Yukon is contained in a comprehensive document titled, "Policy for Northern Development 1971-81", tabled in the Parliamentary Committee on Indian Affairs and Northern Development by the Minister on March 28, 1972. In the setting of objectives and priorities in the North, in line with national policy goals, the essence of choice for the Government is to maintain an appropriate degree of balance among three main elements — people, resources and environment. Achievement of these objectives requires balanced development, permitting extraction of the non-renewable resources while minimizing environmental consequences and maximizing social benefits.

The priorities Government has assigned to the attainment of these objectives concentrate on creation of employment opportunities for native peoples, on liberalization of education and training techniques and on involvement of northern residents in local government. They stress the need for maintaining opportunities for traditional pursuits, safeguarding cultural pride and heritage, strengthening communication and transportation facilities. The construction of new highways and airports in the North and the installation of the communication satellites offer evidence of the Government's effort to bring the North closer to the rest of Canada.

Development of the Canadian North has by now achieved such a momentum that it seems highly unlikely anything could happen that might conceivably slow it down. Even the mammoth $6 billion Mackenzie Pipeline project is rapidly getting closer to reality. Both industry and the federal government have big stakes in northern development, with strong pressure to find and develop the vast pools of oil and natural gas that exist in the North.

For Northern Canada, the years ahead will continue to be a time of discovery of new sources of energy and innovation in transportation methods. It will be a period in which we must settle old problems and find solutions to new ones. The continuing development of the North is among the challenges facing Canadians in their second century of Confederation. One hundred years ago men and women of courage and foresight opened and built Western Canada. Today, people with these qualities will doubtless be found ready to advance our last frontier. Imaginative approaches and special efforts will be required to deal with the unique problems of the North, but the opportunities are many and the rewards most promising.

Coats of Arms — Northwest and Yukon Territories

NWT — Arms: A wavy blue line (the Northwest Passage) on a field of white. Below, a divided shield showing gold billets and a fox's mask. Floral Emblem: Mountain Avens.

YUKON — Arms: Cross of St. George, centered with symbol for fur. Below, a blue line (Yukon River) and two mountains with gold discs (mineral resources). Floral Emblem: Fireweed.

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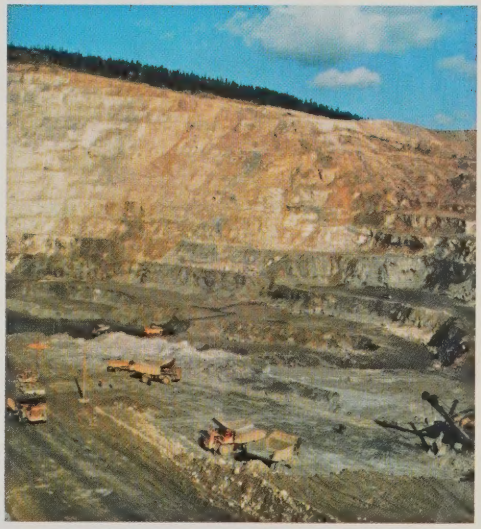

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1 & 2. The scenery is breathtaking in Canada's Yukon Territory, a land of high mountains, swift rivers and evergreen forests. (Courtesy of the Yukon Dept. of Travel and Information).

3. A herd of musk oxen on the barren Ellesmere Island. (Photo Fred Bruemmer).

4. A group of seals enjoying the warmth of the arctic summer. (Photo Fred Bruemmer).

5. A pleasant smile from an Eskimo girl in Tuktoyaktuk. (Photo Michel Perreault).

6. A happy old Eskimo photographed in Inuvik. (Photo Michel Perreault).

7. The radar installation on the DEW line in the remote areas of the Arctic.

8. Anvil's open-pit lead-zinc mine in the Yukon.

9. A barge hauling supplies on the Mackenzie River. (Courtesy of Imperial Oil Ltd.).

10. Artistically framed by drift of snow, Gulf-Imperial-Shell Titalik K-26 well was one of the more important discoveries during 1972-73 winter drilling program in the Mackenzie Delta. (Courtesy of Gulf Oil Canada Limited).

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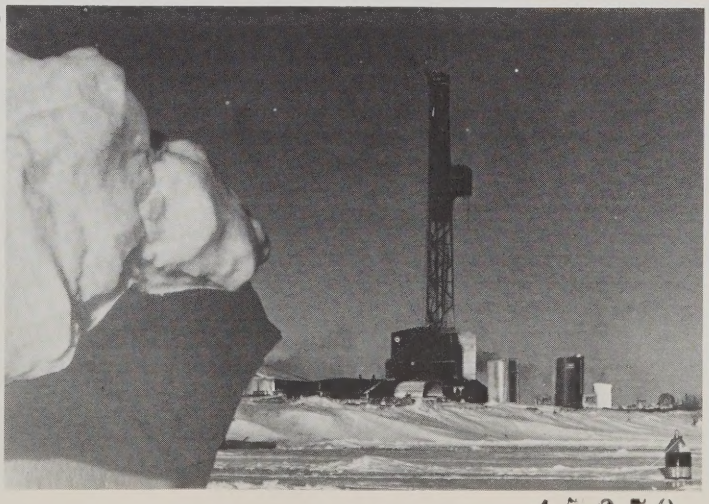

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the northwest territories

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The Territories can be divided generally into two climatic regions — the Arctic and the sub-Arctic. The natural border separating the regions is the tree-line. Most of the western area, the district of the Mackenzie River, is below the tree-line. The true Arctic is above the tree-line and is characterized by barren lands and a harsh climate.

While the Northwest Territories are vast, (1.3 million square miles) virtually unpopulated (38,000) and forbidding in many aspects, they possess significant resources. The oldest industries are hunting and fishing. Both the Eskimos to the north and the Indians to the south maintained themselves for many centuries by these means and they are still the mainstay of a large proportion of the indigenous population. However, it is in the development of the other natural resources — the land, the forests, the minerals and the water — that future economic prosperity lies.

The eastern two-thirds of the mainland and many of the Arctic Islands are covered by the mineral-rich Canadian Shield. The western part of the territory, the Cordillera Region is also rich in minerals. A number of important mineral deposits have already been successfully brought into production. The value of mineral output in the years immediately prior to the establishment of the Pine Point mine in 1964 averaged about $16 million annually. Since then, it has increased more than ten-fold to over $160 million in 1973. Impressive iron-ore bodies have been discovered on Baffin Island and on the Belcher Islands. Other recent large discoveries have occurred on the NWT-Yukon border.

The Mackenzie Valley, the great land masses of the Arctic Coast and Arctic Islands and offshore under Hudson Bay, have for many years been regarded as having great potential for oil and gas. The oilfield at Norman Wells, located 90 miles south of the Arctic Circle on the lower Mackenzie, was discovered in 1920.

The major gas discovery on Melville Island in 1969 followed by the oil success at Atkinson Point, on the Beaufort Sea in January 1970, and the Titalik K-26 well in the Delta in 1972 provided a stimulus for the Petroleum Industry.

The price tag for the 1973-74 exploration effort for oil, gas and minerals is in the order of 500-million in direct spending. It is the sixth year of organized and sustained search for petroleum discoveries.

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The fragility of the embryo economy of the Northwest Territories and its inevitable de-

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pendence on imports, from funds to fresh vegetables, has been overlooked amid concentration on its petroleum prospects and impressive plans for development projects, including highways and pipelines. Thus, the fortunes of this huge part of Canada depend almost entirely on the Federal Government's decisions on near or long-term fuel supplies.

An early decision on the Mackenzie gas pipeline would set in motion economic forces that will bring dynamic change to the present way of life in the Northwest Territories. At this time there can be no precise measure of the impact on the Territories of these multi-billion dollar petroleum pipelines. In the view of NWT Commissioner Stuart Hodgson, pipelines costing $10 billion to $15 billion would open the faucets to release an overall development worth between $30 billion and $40 billion in payroll money, new supporting industries and larger communities.

Gas pipeline construction alone could see an army of as many as 8,000 workers trenching, laying and welding pipe along the 1,300

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miles of the pipeline corridor. Four hundred people would be needed on a permanent basis to patrol and maintain the line.

Communication and transportation services would expand rapidly. The growth of these services is already in evidence at centres such as Hay River, Yellowknife, Inuvik and Tuktoyaktuk. The Federal Government's decision to proceed with construction of a $100 million all-weather highway through the Mackenzie Valley, linking Edmonton to the Arctic Coast has already enhanced the economic development of the Territories.

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Tourism is regarded as a potentially major economic force in the Territories. There were some 25,000 visitors in 1973 and about $6 million was generated by the tourist industry. Commercial fishery contributed $1.1 million to the economy in 1973.

Mindful that human resources are the key to successful development in the North, an extensive system of special programs has been set up by the Federal Government to meet the needs of the local people in helping them to become integrated into an industrial way of life, so that they can contribute to and benefit from the economic development of the region.

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1. *Aerial view of the thriving city of Yellowknife, NWT. (Photo Michel Perreault).*
2. *A section of the town of Inuvik. (Photo Michel Perreault).*
3. *Arctic coast community of Tuktoyaktuk in the NWT.*
4. *The igloo still provides shelter to Eskimos in the remote areas of the Arctic. (Photo by Michel Perreault).*
5. *Imperial's Taglu G-33 well, 70 miles east of Inuvik. Tests showed wells in this field will be capable of gas production at high rates. (Courtesy of Imperial Oil Ltd.).*
6. *Fishing in the midnight sun in the Northwest Territories is a delightful experience.*
7. *Giant Yellowknife mine, one of the largest mining complexes in the NWT.*
8. *The huge lead-zinc mining complex at Pine Point, NWT, one of the largest mines of this type in the world. (Photo Canadian Pacific).*

the yukon

The 75th anniversary of the Klondike Trail of '98 last year saw a greater flow of money into the Yukon than the wealth taken out in the initial Gold Rush. Tourists from all parts of Canada and the U.S., some 250,000 in number, spent their dollars freely as they celebrated the event and recaptured this history of the region immortalized by poet Robert Service.

Aside from a flourishing tourist industry that netted the Yukon more than $25 million in the past year, the mining industry is still by far the biggest single employer and income producer in the Territory. The value of mineral production, helped by increasing mineral prices, reached the $150 million mark, an impressive increase over the $106,781,000 for 1972 and $21,366,000 in 1968.

Commissioner James Smith is optimistic that the bright economic outlook of Yukon's neighbors, Alaska and the Northwest Territories, will have a positive effect on the prosperity of the Yukon Territory. He was referring to the long awaited pipeline projects and the more encouraging oil and gas exploration activity.

Construction in the capital city of Whitehorse (population of 12,000) alone has been booming at the rate of more than $8 million a year for 1972 and 1973, and 1974 is expected to be even higher. The recently announced intention of the Yukon Housing Corporation to construct 165 units this year will contribute significantly to improved housing in the Territory. The outlook is also bullish for the engineering construction category with such projects as the Aishihik hydro-electric development, the Dempster Highway and the Skagway road.

Transportation as the key to northern resource development was never more appropriate than in the context of the Yukon's Dempster Highway. When completed in 1975, the 365-mile long gravel highway will provide year-round access to the Mackenzie Delta. Apart from the oil and gas exploration activities there, it will provide impetus for further exploration of Eagle Plains and Peel Plateau areas of northern Yukon, both known to have oil and gas potential. When the Dempster Highway is completed to the Arctic, and the planned road from Whitehorse to Skagway, Alaska is finished, it will be possible for the tourist to drive from the Pacific to the Arctic Ocean.

The majestic beauty of the Yukon casts a spell on the visitors. Many tourists visit the Yukon to see the relics of the historic Klondike Gold Rush, but a large number also come to enjoy the scenery. Kluane National Park which takes in 8,500 square miles of land, contains some of the most spectacular and some of the highest mountain peaks in the world. The St. Elias chain includes Mount Logan, the highest peak in Canada at 19,850 feet. The Park also has the most spectacular ice fields and some of North America's finest wildlife populations, including grizzly bears and the majestic white Dall sheep. Last year a visitor to the Yukon exclaimed, "It's God's last frontier and should be preserved in all its beauty."


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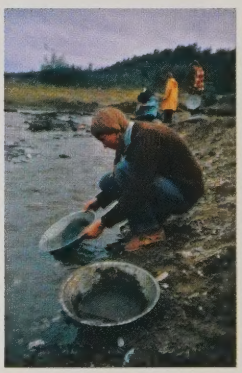
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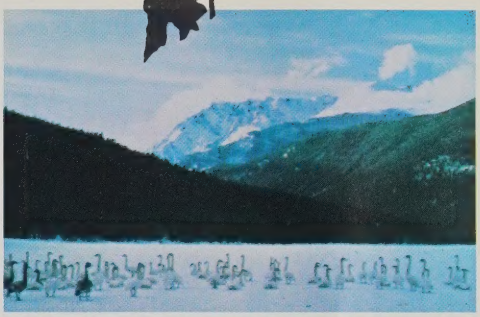

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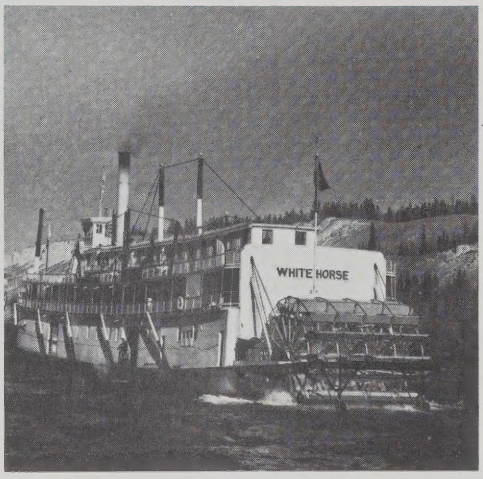

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1. *The old sternwheelers, part of a large fleet of boats which once plied the Yukon River between Whitehorse and Dawson.*
2. *An old general store which dates back to the days of the gold rush in Dawson City.*
3. *The ruggedness of the terrain of the gold trail of '98.*
4. *The real pioneers of the Yukon were the gold diggers of the 1898 era.*
5. *A young lady tourist panning gold.*
6. *A clear water stream running through mountains of rocks.*
7 & 8. *Dawson City (left) and Whitehorse offer a contrast between the old and the new.*
9. *There are many old log houses still to be seen in the Yukon.*
10. *The N.V. Schwatka offers a comfortable ride into history through Miles Canyon on the Yukon River.*
11. *A flock of snow geese has landed on a frozen lake in the Yukon.*
12. *Vegetation including wild flowers is plentiful south of the tree-line in Canada's North.*
13. *The sternwheeler "Whitehorse" following the Yukon River.*
14. *Can-can girls whip up a wild dance during the annual Klondike celebration.*
15. *Cassiar Asbestos Clinton-Creek open-pit mine in the Yukon.*
16. *The open-pit Anvil mine at Faro in the Yukon.*

(All photos appearing on these pages were supplied by the Yukon Dept. of Travel and Information with the exception of No. 11 and 12, two Fred Bruemmer photos and 15 and 16, two George Hunter photos.)

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the north, a treasure chest of resources

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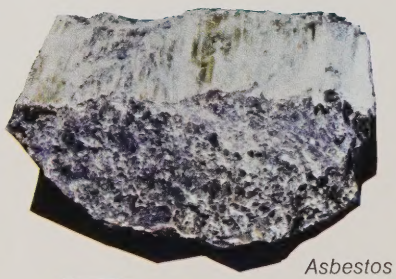
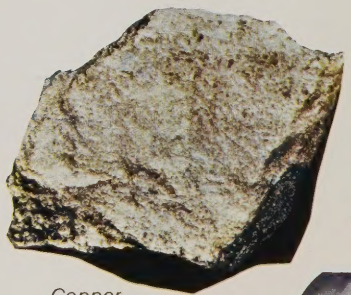
The natural treasures of Canada's northern frontier are well known to hunters, trappers and fishermen, with scenery that is unspoilt, animals that hardly recognize a human and fishing in unpolluted waters. However, the more important resources in the North consist in the hydrocarbon treasures that are still buried deep in the earth and the immense mineral deposits scattered across two million square miles of the Yukon and Northwest Territories. Valued at between $50 billion and $100 billion, these mineral deposits are begging for development through investment and the establishment of the necessary transportation facilities.

For oil and natural gas, estimates made by consulting firms range up to more than 100 billion barrels of oil and 650 trillion cubic feet of gas. These figures are estimates only, but they are supported by an accelerated degree of exploration and investment.

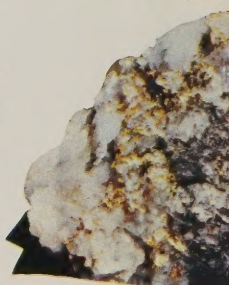
Information from the Petroleum Industry shows that by the end of this drilling season, a total of 25 trillion cubic feet of gas will have been discovered in the Mackenzie Delta, while 15 t.c.f. to 20 t.c.f. of natural gas has already been found



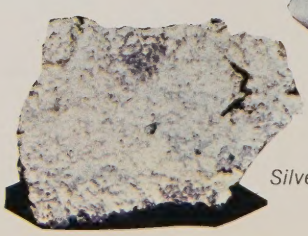
Asbestos



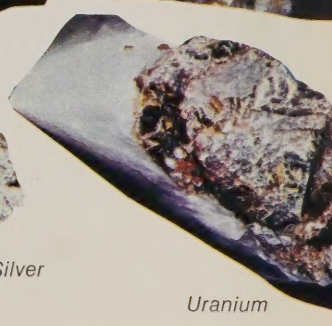
Copper



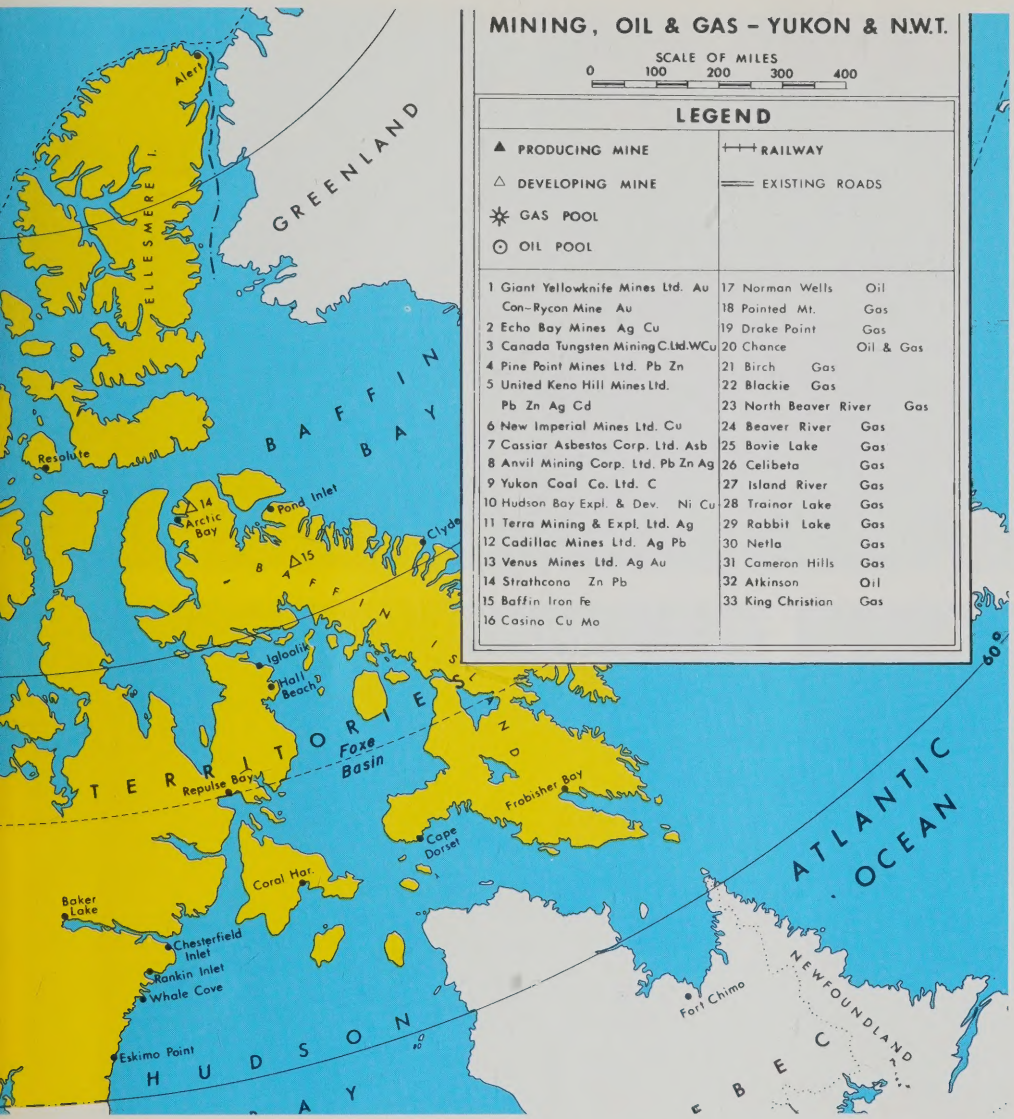
Lead



Silver



Uranium



Gold

Iron Ore

Zinc

in the High Arctic Islands. The figure of 25 trillion cubic feet is the minimum amount of natural gas necessary to justify construction of a pipeline down the Mackenzie Valley.

The Mackenzie Delta, the Tuktoyaktuk Peninsula and the Arctic Islands have so far yielded four oil finds and more discoveries are expected.

Exploration costs for oil and gas are extremely high, but despite staggering capital investment, formidable physical problems, and critical environmental considerations, government and private enterprise must work together to harvest the northern resource wealth in the interests of all Canada and the economic future of the North.

1. *Eskimo trapper displays white fox pelts.*
2. *Three Edmonton fishermen proudly show their catch taken from a lake in the NWT.*
3. *Imperial's refinery and storage tanks at Norman Wells, on the east bank of the Mackenzie River. (Courtesy of Imperial Oil Ltd.).*
4. *Seismic testing for oil and gas in the Arctic.*
5. *One of Panarctic Oil Ltd.'s exploration sites. (Courtesy of Canadian Pacific).*
6. *One of many open-pit mining operations.*

Eight of the most important minerals and rare metals found in Canada's North. (Courtesy of the Mining Association of Canada).

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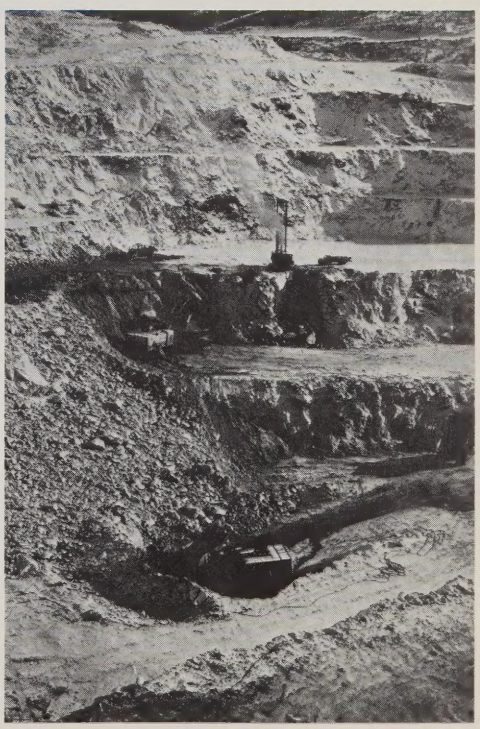

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development & the environment

Maintenance of the ecological balance in the North requires recognition of the total relationship of all the elements of nature. Man is included in this totality and his activities must be measured and in some instances regulated to ensure that the probability of imbalance is minimized. The natural environment in the North is very sensitive to alterations. Activities related to the natural resource-base which have evolved elsewhere in Canada may not be satisfactory, particulary in the Arctic. It's one of Canada's last great wilderness areas and it must be spared from the ecological blunders man has committed in some other parts of the world. This is not necessarily easy because the Arctic is in some ways fragile. But it is also full of life.

The animals of the Arctic live in a region of extremes. It's bitter cold and dark in winter; briefly hot and bright in summer when the sun shines day and night. There is so little precipitation that the area is classed as a desert. Yet poor drainage and slow evaporation leave so much water on the ground in summer that the tundra plains are virtually awash.

At first glance, the winter Arctic looks lifeless, but even on the coldest, darkest days there are creatures moving, taking part in an incredibly complicated web of life that is exquisitely adapted to this exuberant land.

The Arctic is being studied by the oil industry, the government, and the scientific community. The cost has already reached $50 million and the research is still going on. Canadian Arctic Gas Study Limited, an organization of companies, is researching ways

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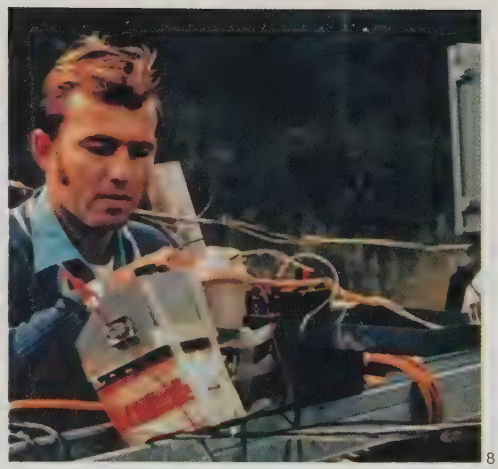
to construct and operate pipelines in harmony with the northern environment. In two years, Canadian Arctic scientists have probably amassed as much knowledge of Arctic birds, fish, animals and vegetation as in all the previous years that white men have roamed the North. But every conceivable problem must be anticipated before a pipeline can begin. Pipeline construction and later the presence of a buried line must not be allowed to disturb bear or fox dens, caribou or musk ox calving grounds, or any migration routes. Also, the whine of pipeline compressors or low-flying aircraft must not intrude on Arctic wildlife.

Canadian Arctic Gas Study's Sans Sault test site is helping determine the effects of buried and elevated pipelines on permafrost.



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The soil condition known as permafrost can be rock, gravel, sand or silt, and it presents no problem so long as it stays frozen. When vegetation is stripped off, ice-rich permafrost thaws and slumps, leaving a mud hole. When drilling on permafrost, rigs and buildings must be placed on piles or gravel pads.

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All the findings and all the data gathered by Canadian Arctic Gas Study Ltd. as a result of its extensive environmental studies will be included as evidence when the organization applies to Ottawa for a pipeline permit, probably this year. The extensive northern environmental studies conducted by the federal government itself will help it to evaluate the application.

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1. *The Arctic wolf.*
2. *An Arctic owl.*
3. *Ptarmigan in its summer plumage.*
4. *Other members of the grouse family.*
5. *The majestic polar bear.*
6. *Two technicians measuring sub-soil temperatures around buried experimental pipeline at Inuvik, NWT.*
7. *Canadian Arctic Gas Study's Sans Sault project permits study of environmental effects of operating buried and elevated pipelines in the Arctic.*
8. *The soil's capacity to conduct heat being measured by a geologist at Norman Wells.*
9. *A recording device to measure exactly the effect of sunlight on a pipeline at the Sans Sault, NWT research project.*
10. *Two scientists setting up a seine net to determine numbers, species, and size of fish in channels around Richards Island, NWT.*

(Artwork of map on page 10 and all photos on page 11, courtesy of Imperial Oil Ltd. Photos 1-2-4 — Michel Perreault; Photos 3-5 — Fred Bruemmer.)

transportation & the north

If Canada is to develop her mineral and petroleum resources in the North, and to develop them rapidly, efficiently and with minimal harm to the ecology, it is obvious that transportation will play a vital role.

The construction of transportation links in the Arctic is not an entirely new endeavour. The Alaska Highway, built by the Americans as a defence measure during the Second World War, stretches 1,523 miles from Dawson Creek, B.C. to Fairbanks, Alaska. Of its total length, 1,221 miles are in Canada and 302 miles are in Alaska. This gravel highway has been essential to the economic development of the region and has also stimulated tourism in the Far North. The Dempster Highway is progressing from Dawson City to the Mackenzie Delta. The Fort Nelson — Fort Simpson link will soon be complete and a Whitehorse — Skagway road will be constructed in a first stage from Carcross to the Yukon border. The Mackenzie Highway is now completed from Fort Smith on the Alberta border to Fort Simpson. The completion of the highway from this point northward to Tuktoyaktuk on the Arctic Ocean, a distance of 1,049 miles, will cost a total of $125 million.

To date there is only one major railroad in the Far North: the White Pass and Yukon Railway. This narrow-gauge railroad completed in 1900, winds 110 miles south from Whitehorse in the Yukon to Skagway on the Pacific Coast. Although providing passenger service for tourists, it is primarily devoted to the movement of containers that are shipped by sea to and from Skagway. In recent months many studies have been undertaken to examine the feasibility of constructing a railroad along the Mackenzie River to the Arctic Ocean, although as yet no definite plans have been announced. A study made by CN in 1973 has also concluded that rail systems could be feasible in the Mid-Canada Corridor. The proposed rail construction, calling for 5,300 miles of new railway at a cost of $1.6 billion, does not include the Mackenzie Valley railway, but would consist of extended branch lines from coast to coast jutting up into Canada's north country.

From the earliest days, the Mackenzie has been the water route to the western Arctic and water transport is still the chief means of moving freight in the North. Barges loaded at Hay River on Great Slave Lake, served by both a rail line and a road, travel 1,200 miles down the Mackenzie to Tuktoyaktuk on the Beaufort Sea. From there they go west some 350 miles to Prudhoe Bay. Barges on the Mackenzie are smaller than the deep-water barges that run north from Vancouver because of the Mackenzie's 5-foot draft limit. Scheduling is critical since the Mackenzie has only a 120 day season. Under ideal conditions it takes four days to go down river from Hay River to Tuktoyaktuk, and two more

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1. *A payload hovercraft produced by Bell Aerospace Canada Ltd. for service in the Arctic.*
2. *New roads are rapidly opening up the Far North.*
3. *The snowmobile has proven to be a useful means of transportation.*
4. *A fleet of wide track tractormobiles used to transport equipment in the Arctic.*
5. *A Twin Otter plane, one of the most practical aircrafts used in the Far North.*
6. *Hovercraft engaged in hydrographic survey along the Arctic Coast in the vicinity of Franklin Point.*
7. *A transport helicopter has just landed at Black Angel Mine, Marmorilik, Greenland which is operated by Cominco. (Courtesy of Canadian Pacific).*
8. *Water transportation by barge is by far the most economical way to ship supplies to the Arctic.*

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9. The Port of Hay River on the Mackenzie River is where the barges are loaded for shipments to the Arctic. (Courtesy of Northern Transportation Co. Ltd.).
10. A Pacific Western transport plane being unloaded at a busy airport in the Canadian North.
11. The super tanker "Manhattan" plowing through the ice fields during her historical voyage in 1969.
12. The heavy-duty helicopter is the most versatile carrier used in the Arctic.

days of ocean travel to Prudhoe Bay. Another form of marine transportation that may be developed in the North involves the use of giant icebreakers. And indeed the feasibility of using such ships year-round has been proven by the successful voyages of the icebreakers St. Laurent and the Manhattan.

Air transportation has been increasing rapidly in the Far North and a multitude of carriers offer scheduled passenger flights to most settlements. Conventional propellor and jet aircraft also transport cargo, although their restricted capacity does not allow for movement of large quantities of freight. Large helicopters, called skycranes, are being used successfully for moving freight from barges to inland locations and further experimentation in this mode is a certainty.

Other kinds of transportation vehicles are under study at the present time, among them 324-foot cargo-carrying airships, large caterpillar tractors capable of hauling long lines of sleds overland, and a variety of air cushion vehicles that will cause the least disturbance of the northern ecology. Battery-powered submarines will soon roam under the Arctic ice conducting seismic oil search surveys. It is only with the growth of the transportation modes that the development of Canada's North can be fully accomplished.

CANADA CEMENT LAFARGE AND **northern development**

Canada Cement Lafarge has, for many years, been involved in supplying different types of cement used in the development of the Canadian North. During the cold war days of the early fifties, cement was shipped in 90 lb. drums for use in the construction of the DEW line in remote areas of the Arctic. Crates containing six drums of cement strapped together were shipped from the Montreal East plant by vessel to Rimouski and Halifax; then these supplies were flown to the Arctic by means of cargo planes. Other shipments were made to Baffin Island for the construction of schools and other buildings. The cement was transported in moistureproof bags, inserted in polyethylene packages, via vessels which were reinforced for sailing through ice flows.

Large quantities of cement were used for the construction of mining complexes both in the Northwest and the Yukon Territories in the early sixties. The demand for cement tapered off from 1965 to 1969, the year which marked a flurry of oil exploration activities. That year a substantial increase in shipments of oil-well cement was noted, and it is continuing at an increasing rate in the seventies. Most of the oil-well cement is shipped from the Edmonton plant of the company to Hay River, NWT, from which point it is transported by barge along the Mackenzie Delta and oil fields to the Far North. The Pacific Region of the company also ships large quantities of cement to the Yukon for mining developments and general construction work in cities such as Whitehorse and Dawson.

Shipments of "Ciment Fondu" both in bulk and in bags carried in palletized Klimpboxes have also been made from Montreal using water transportation. With the anticipated innovations in transportation methods and the completion of the main highways, it is expected that the increase in the market of cement, ready-mixed concrete and concrete products will parallel the rate of growth and development in the North.

Northern Development and the Western Region

by Robert L. Hudson, Edmonton

In view of recent developments, it is difficult to refer to the current energy situation as a "crisis" when one speaks of Western Canada. Westerners are busy preparing for massive projects of a magnitude so great that we may experience a different "crisis", a human resources crisis. All of this rapid economic and industrial growth is a direct result of the world energy crisis. A review of the effects brought about by energy related development in the North may assist us in understanding this situation.

The search for fossil fuels in the Mackenzie Delta continues at a staggering pace. In the Territories, it is believed that the oil industry spent more than $225 million in 1973. In comparison, in 1971, seventy-five new field wildcats were drilled at an estimated cost of $170 million and in 1967 the industry expenditures in this area totalled a mere $24.1 million. Now that the U.S. Government has decided to proceed with the Alyeska pipeline, the reserves in the Delta must be proven sufficient in quantity to justify spending between $5 and $6 billion on the Mackenzie Delta Pipeline Project.

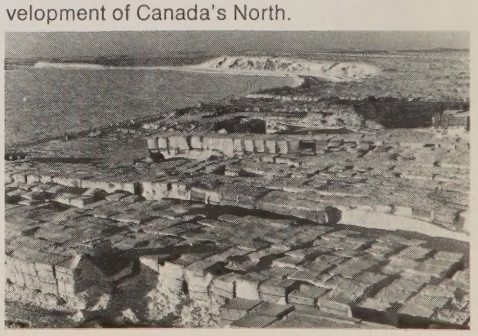
Canada Cement Lafarge Ltd. has played a challenging role as a supplier of down-hole cements to the exploration market in the Mackenzie Delta. In consultation with the major oil companies active in the Delta, Canada Cement Lafarge Ltd. has added Class "G" Oil-Well Cement to its other types of cement designed to serve the oil industry. Class "G" provides the industry with a cement that meets rigid specifications and assures a more predictable performance down-hole. At the present time, the cement grinding and finishing plant located in Edmonton is the only company plant producing and distributing this specialty product.

Considering the extreme handling problems at temperatures reaching 60° below zero, the ever present snow, and the fact that the stockpiles of materials in the Delta are often exposed to the elements for periods as long as two years, one can imagine the importance of adequate and sound packaging methods. Close cooperation between the company, container manufacturers and the oil industry has resulted in the development of special packages and containers for use in the North. Two ton, seven ton, and even twenty ton containers: some collapsible, some rigid, some poly-lined, some walk-in, and some requiring assembly; but all presenting some unique characteristic. Also, the very short shipping season on the Mackenzie River calls for tight scheduling and special coordination of distribution.

An application to the energy board will be made sometime this year to build the $6 billion Mackenzie Valley Pipeline. The pipeline will have a large diameter, high pressure facility with a capacity of 4.5 billion cubic feet of gas per day. It will stretch 2,598 miles from the Arctic Coast to the American Midwest.

The initial timetable for the project provides for the beginning of construction in the winter of 1976-77, and for the moving of gas from the Mackenzie Delta by the fall of 1978.

To what extent the cement industry will become involved in the project is yet unknown, but no doubt there will be a need for concrete pipe weights and concrete piles. The discovery of fossil fuels in Northern Canada has considerably stimulated the economy of the North. However, the shortage of manpower presents a problem to all participating industries and to governments. Perhaps it is an era when we of the west should invite the rest of Canada to "Go West Young Man" and to join in the excitement of the development of Canada's North.



industry news

Canada's construction volume should reach the $22 billion mark this year, an increase of $3.5 billion over 1973. In its 10th annual review, the Economic Council of Canada predicted that construction will be Canada's fastest growing industry over the next two years, moving up from seventh in rank to replace utilities in the spotlight.

Of the predicted 20% increase in dollar volume for 1974, it is estimated that 12% will represent physical growth. The high degree of activity in the industrial and commercial sectors will contribute greatly to the overall increase, while housing is expected to be down slightly from last year's record of 268,529 units. However, the decline in real terms in residential construction may be less than 5%.

Road spending in Canada will reach $2.5 billion in the 1974-75 fiscal year, an increase of $100 million over the previous term, according to the Roads and Transportation Association of Canada. Priorities include a wide range of projects, upgrading of existing highways, new roads in rural and northern areas, as well as provincial grants to local governments to improve municipal street systems and grants to provinces under a number of federal programs. A number of large industrial, utility and commercial projects are presently under construction and several are due to begin in 1974 in different parts of Canada. Among the largest in the eastern section of Canada are the following: the proposed $150 million waterfront development and the $200 million Cadac Development in the Halifax-Dartmouth area — the New Brunswick Electric Power Commission's $200 million Thermal Generating Station at Coleson Cover near Saint John — the deepwater terminal at Lorneville, N.B. — the completion of the Place Quebec Commercial Complex in Quebec City.

Montreal was rediscovered as an area of investment last year and renewed interest sparked a return to a level of activity that surpasses the Expo 67 era. The surge of activity, centered on hotel, office and other commercial complexes, reflected a spectacular 35 percent jump in the value of commercial construction recorded across the Province. Other activities include the extensions to Montreal's Metro system, the 76 Olympic facilities, Mirabel jetport, the $6 billion James Bay hydro-electric project, including roads from Matagami to La Grande and additions to the highway and expressway network around Montreal. The total provincial volume of construction in Quebec is expected to be near the $5 billion mark this year.

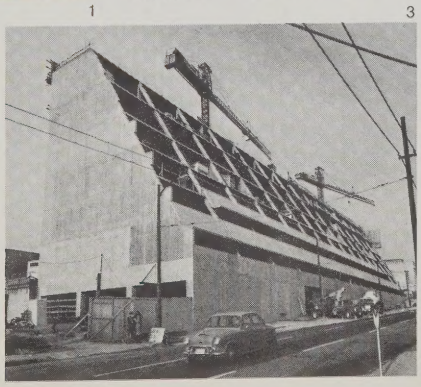
The outlook for Ontario's economy is bright in spite of the energy situation, and a 20 percent rise in business investment is predicted. The investment surge is expected to be most apparent in the manufacturing industry, but large capital projects are planned also in the steel, chemical and pulp and paper industries. All major cities in Ontario have several urban renewal construction programs underway. The CN Communications Tower in Toronto is the most spectacular project presently under construction in Ontario.

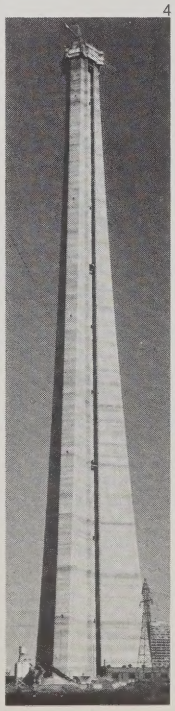
The Ontario Transportation Development Corporation has been established to develop a full range of transit systems to meet the growing needs of a growing urban population.

Manitoba is continuing the development of hydro-electric power in the northern part of the Province and a new copper-zinc mining complex is being developed in the Flin Flon Snow Lake area. The comprehensive Lakeview Square Development is revitalizing Winnipeg's downtown core and changing its skyline.

The construction industry in Alberta is heading for a very busy year. In addition to the activity in petrochemicals, and the rapid physical growth of Edmonton and Calgary, Syncrude Canada Ltd. is expected to start construction of its $1 billion oil tarsands project.

Capital investment in British Columbia is expected to increase in 1974 and if no large-scale work stoppages occur, construction should remain at a high level.





1. Erection of a 90-ton, 76 ft. long precast concrete wall section for the ICAO building on the Aviation Square project in Montreal. These precast elements are manufactured by Prefac Concrete Co. Ltd.
2. New highrise commercial building on President Kennedy Avenue in Montreal.
3. Canadian Broadcasting Corporation's Pacific Headquarters and studios under construction in Vancouver.
4. The spectacular CN Communications Tower in Toronto.

Cement Supply to be Adequate

Officials of the cement industry do not anticipate any problem in meeting the requirements of the construction industry this year, since the effective capacity of production of Canadian plants will be 14.1 million tons, an increase of 1.2 million ton over the 1973 available supply. Last year the cement industry in Canada sold 11.6 million tons domestically and abroad, out of an effective productive capacity of 12.9 million tons.

Francon Producing Concrete Railroad Ties

Francon, a Division of Canfarge Ltd. has received an order from Canadian National Railways for 300,000 concrete railroad ties. Some will be used on a 45-mile stretch between Winnipeg and Portage La Prairie, Manitoba, and others will be used east of Quebec City.

1. "How to Build a Patio of Ready-Mixed Concrete" is a comprehensive guide for the construction of a strong, long-lasting concrete patio. With a variety of colours and designs to choose from, your concrete patio will give you excellent service for many years to come.
2. "Tilt-Up Concrete Buildings — A Value Decision" examines the fundamentals and advantages of tilt-up construction principles for planning and estimating tilt-up panels. It also includes some suggested floor plans for tilt-up concrete buildings. It is a must for architects, engineers and developers.

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A sea of icebergs at Iceberg Point in the Northwest Territories.

Rackla Range of Richardson Mountains in the Yukon, the site of an iron-ore deposit find.